Inventors: Hideaki KIMATA
Filed: December 7, 2005
Title: Image Encoding Device, Image Decoding Device . . .
Attorney Docket: 44471/323889
Attorney of Record: Brenda O. Holmes
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Phone: 404.815.6500
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FIG. 1

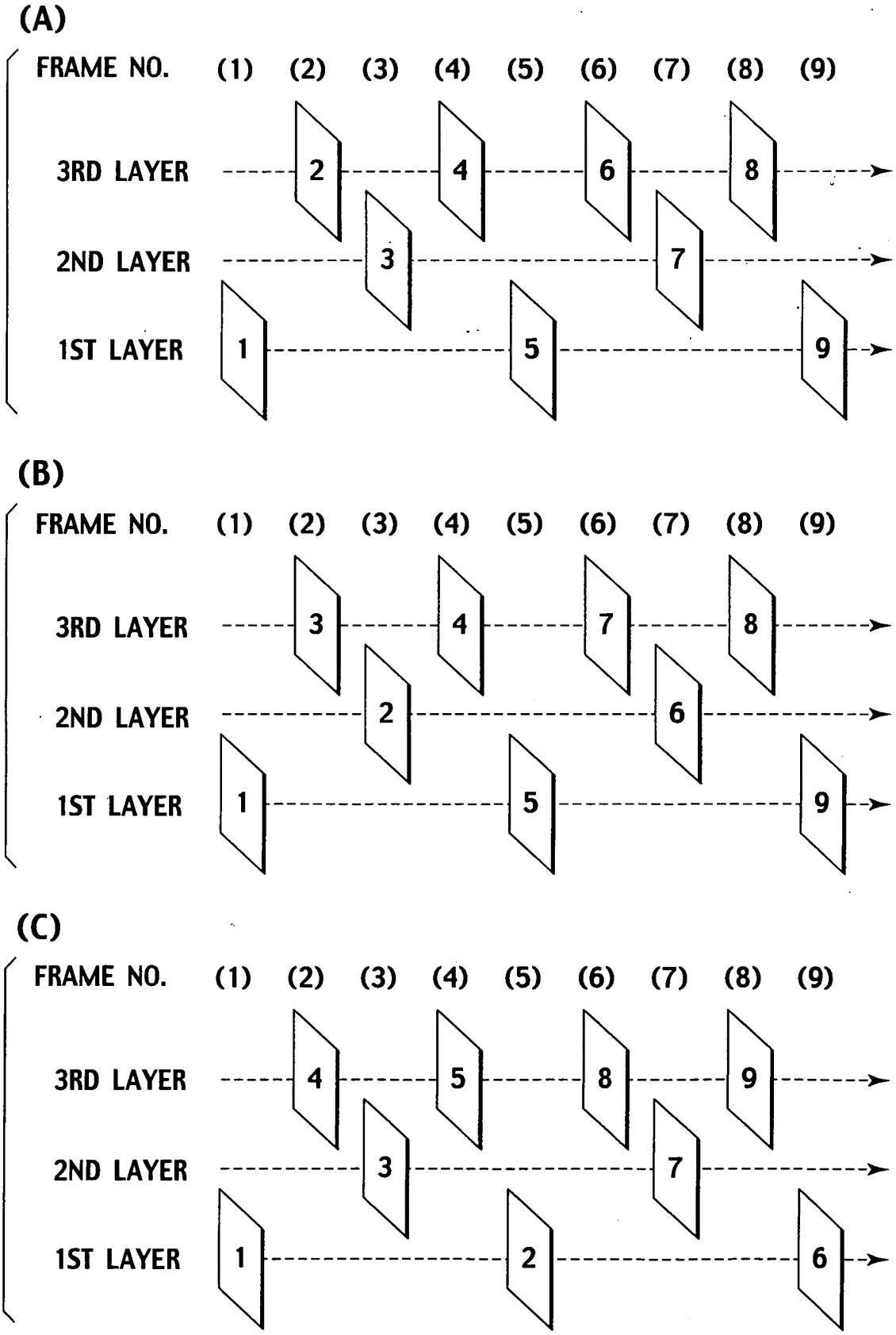

FIG. 2

FRAME NUMBER	ORDER FOR NUMBERING REFERENCE IMAGE DATA AS (0, 1, 2, ···)
(2)	(3) , (5) , (1)
(3)	(5) , (1)
(4)	(2) , (3) , (5) , (1)
(5)	(1)
(6)	(7) , (9) , (4) , (2) , (3) , (5) , (1)
(7)	(9) , (3) , (5) , (1)
(8)	(6) , (7) , (9) , (4) , (2) , (3) , (5) , (1)
(9)	(5) , (1)

FIG. 3

FRAME NUMBER	ORDER FOR NUMBERING REFERENCE IMAGE DATA AS (0, 1, 2, ···)
(2)	(3) , (1) , (5)
(3)	(5) , (1)
(4)	(3) , (5) , (2) , (1)
(5)	(1)
(6)	(7) , (5) , (4) , (9) , (3) , (2) , (1)
(7)	(9) , (5) , (3) , (1)
(8)	(7) , (9) , (6) , (5) , (4) , (3) , (2) , (1)
(9)	(5) , (1)

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FIG. 4

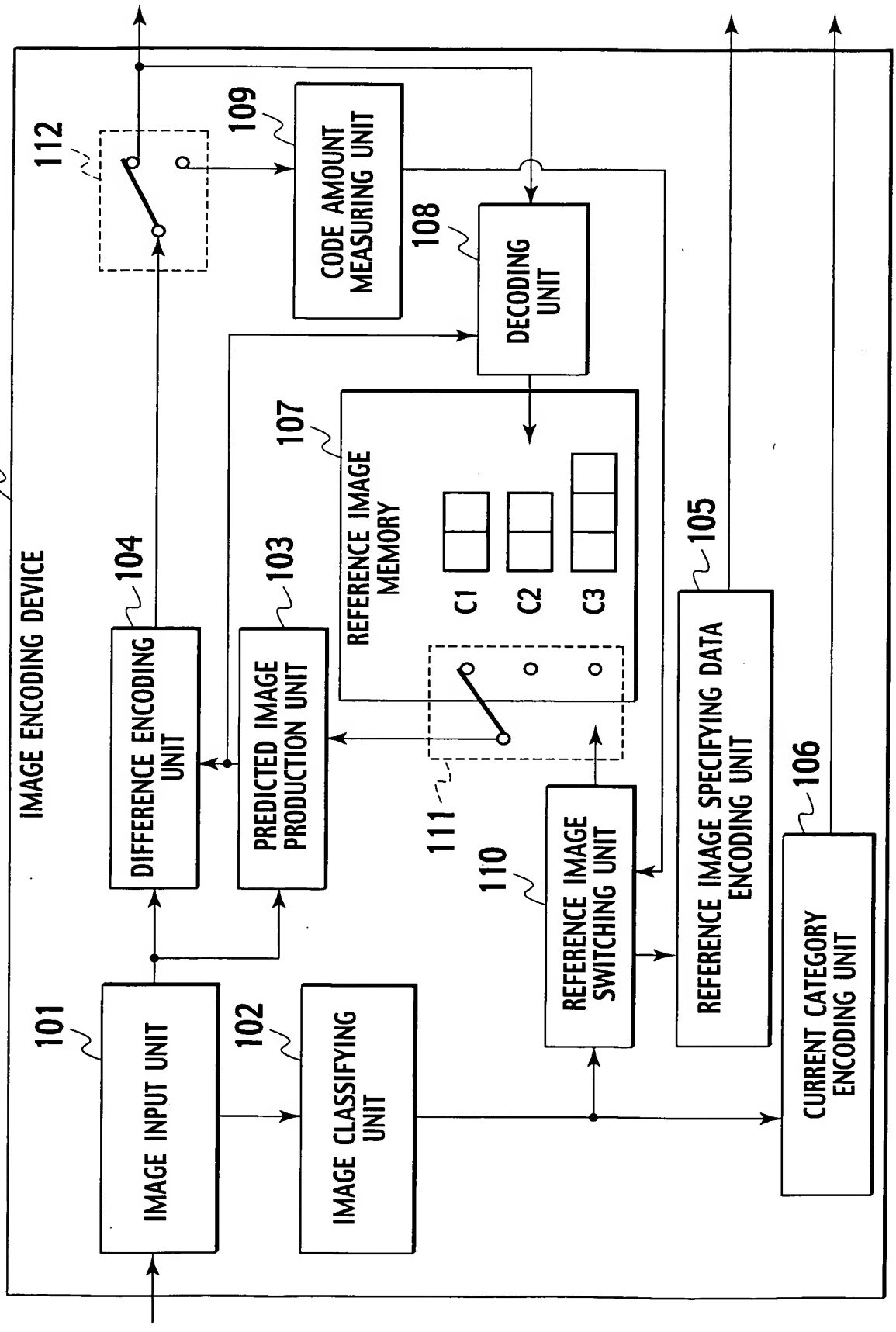

FIG. 5

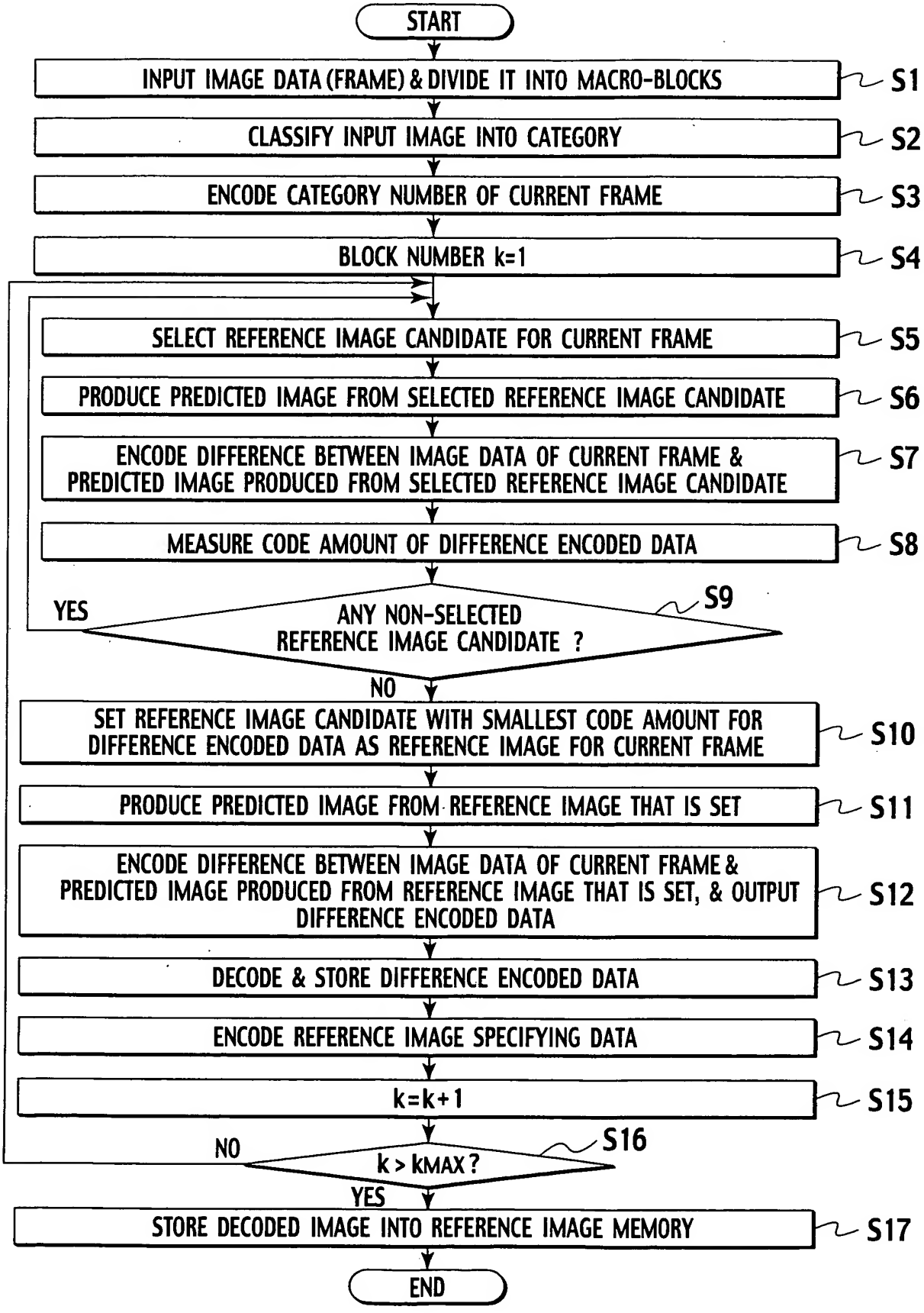
START
INPUT IMAGE DATA (FRAME) & DIVIDE IT INTO MACRO-BLOCKS
S1
CLASSIFY INPUT IMAGE INTO CATEGORY
S2
ENCODE CATEGORY NUMBER OF CURRENT FRAME
S3
BLOCK NUMBER k=1
S4
SELECT REFERENCE IMAGE CANDIDATE FOR CURRENT FRAME
S5
PRODUCE PREDICTED IMAGE FROM SELECTED REFERENCE IMAGE CANDIDATE
S6
ENCODE DIFFERENCE BETWEEN IMAGE DATA OF CURRENT FRAME & PREDICTED IMAGE PRODUCED FROM SELECTED REFERENCE IMAGE CANDIDATE
S7
MEASURE CODE AMOUNT OF DIFFERENCE ENCODED DATA
S8
ANY NON-SELECTED REFERENCE IMAGE CANDIDATE ?
S9
YES
NO
SET REFERENCE IMAGE CANDIDATE WITH SMALLEST CODE AMOUNT FOR DIFFERENCE ENCODED DATA AS REFERENCE IMAGE FOR CURRENT FRAME
S10
PRODUCE PREDICTED IMAGE FROM REFERENCE IMAGE THAT IS SET
S11
ENCODE DIFFERENCE BETWEEN IMAGE DATA OF CURRENT FRAME & PREDICTED IMAGE PRODUCED FROM REFERENCE IMAGE THAT IS SET, & OUTPUT DIFFERENCE ENCODED DATA
S12
DECODE & STORE DIFFERENCE ENCODED DATA
S13
ENCODE REFERENCE IMAGE SPECIFYING DATA
S14
k=k+1
S15
k > kMAX ?
S16
NO
YES
STORE DECODED IMAGE INTO REFERENCE IMAGE MEMORY
S17
END

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FIG. 6

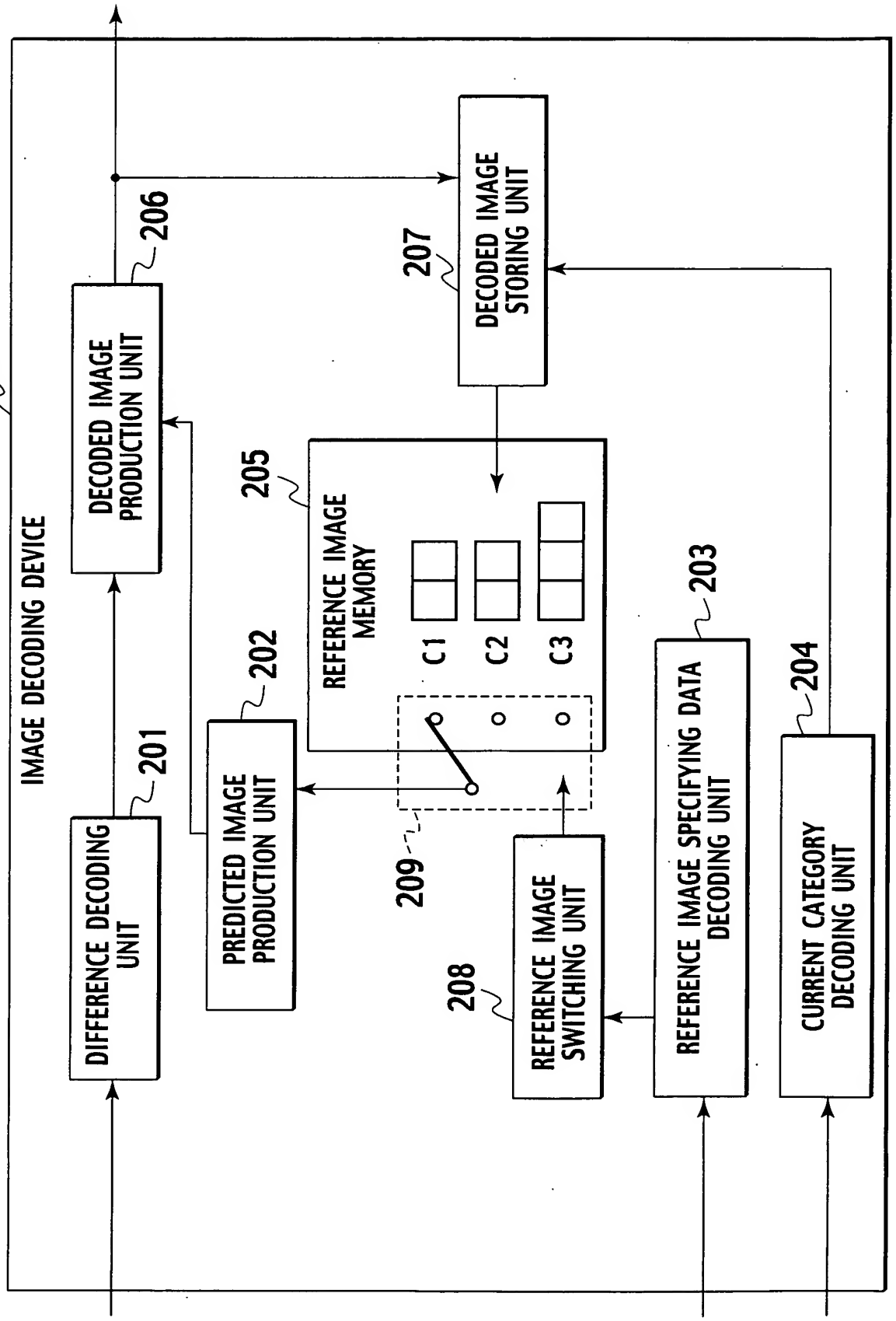

FIG. 7

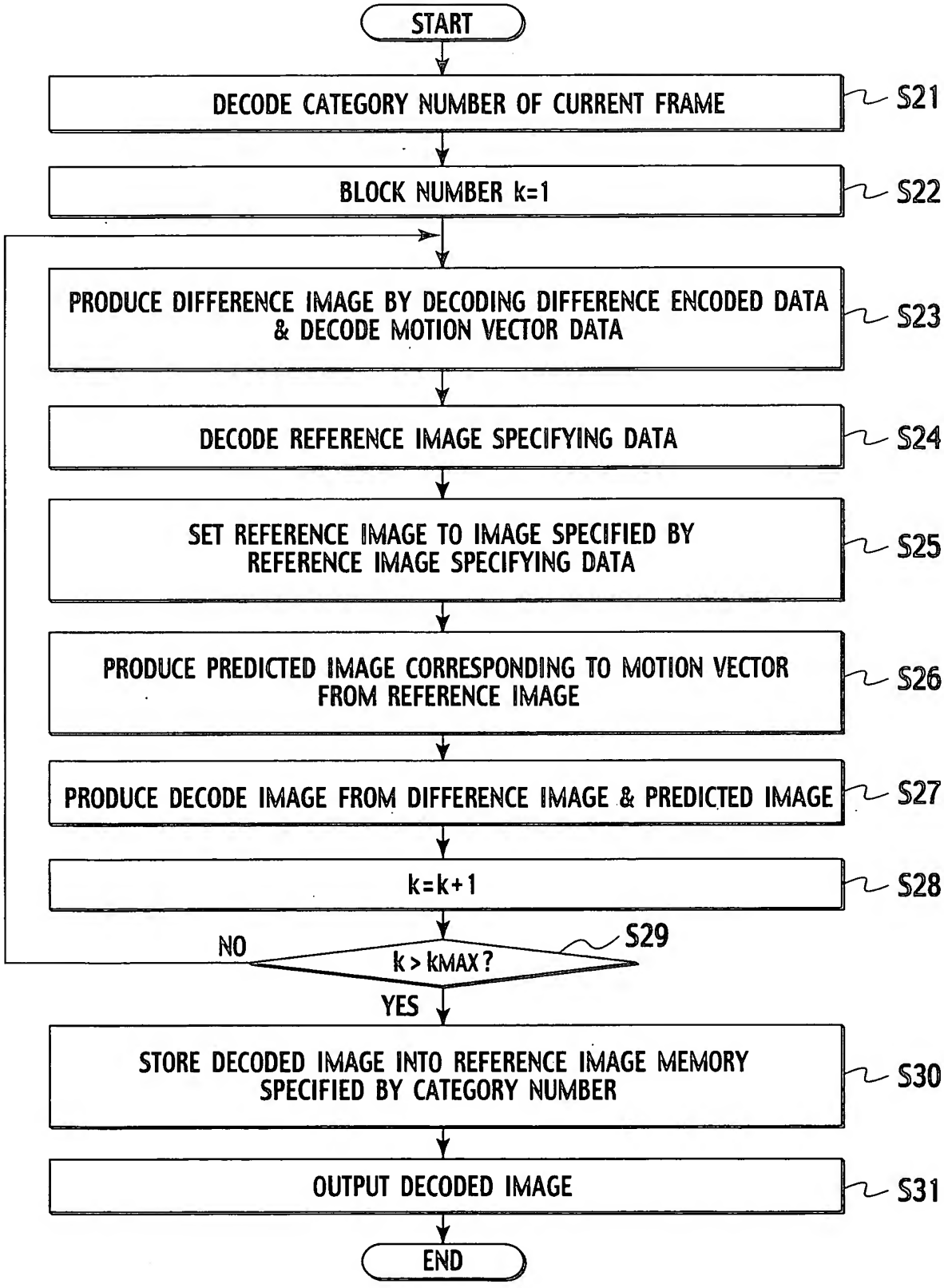
START
DECODE CATEGORY NUMBER OF CURRENT FRAME
S21
BLOCK NUMBER k=1
S22
PRODUCE DIFFERENCE IMAGE BY DECODING DIFFERENCE ENCODED DATA & DECODE MOTION VECTOR DATA
S23
DECODE REFERENCE IMAGE SPECIFYING DATA
S24
SET REFERENCE IMAGE TO IMAGE SPECIFIED BY REFERENCE IMAGE SPECIFYING DATA
S25
PRODUCE PREDICTED IMAGE CORRESPONDING TO MOTION VECTOR FROM REFERENCE IMAGE
S26
PRODUCE DECODE IMAGE FROM DIFFERENCE IMAGE & PREDICTED IMAGE
S27
k=k+1
S28
NO
k > kMAX?
S29
YES
STORE DECODED IMAGE INTO REFERENCE IMAGE MEMORY SPECIFIED BY CATEGORY NUMBER
S30
OUTPUT DECODED IMAGE
S31
END

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FIG. 8

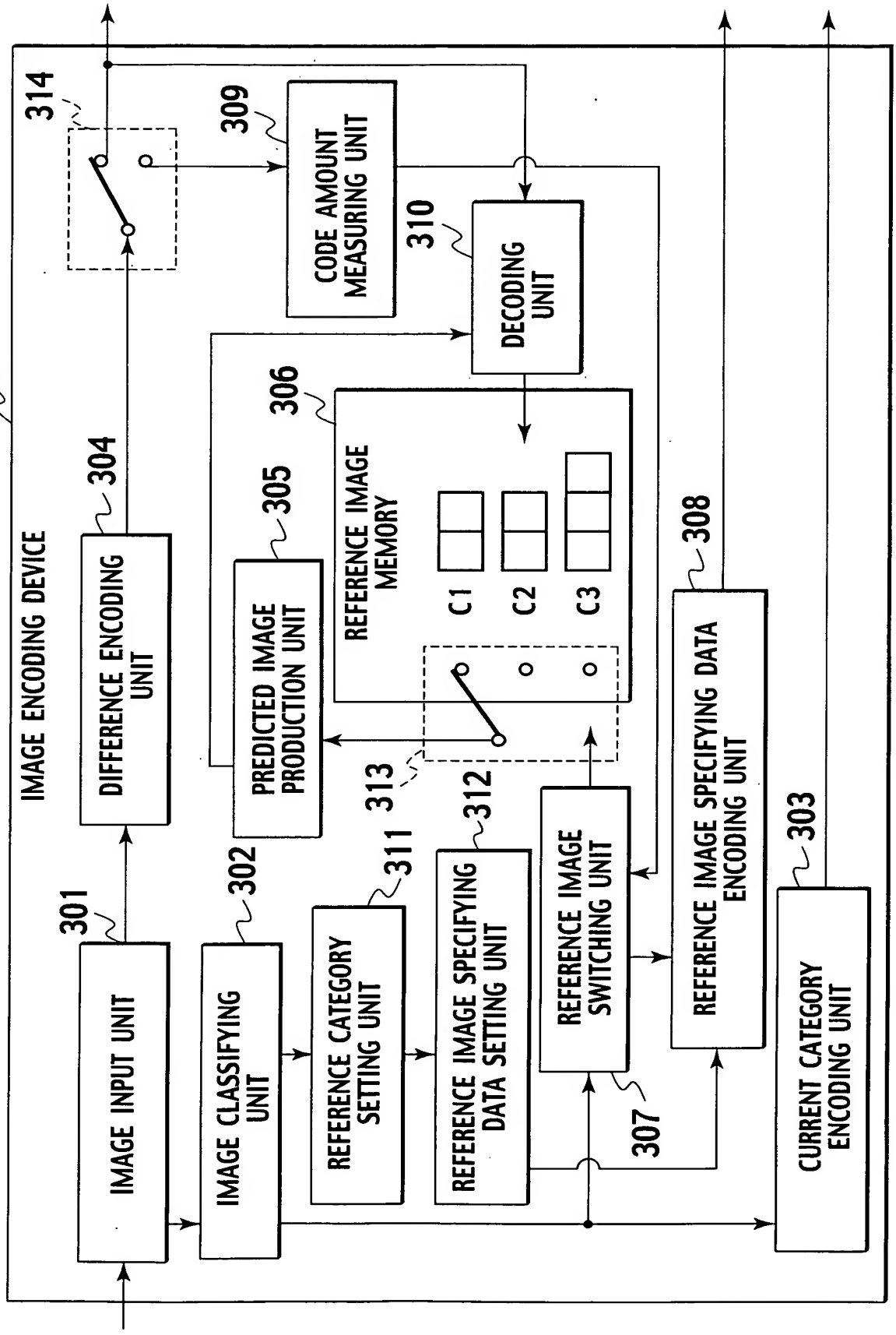

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FIG. 9

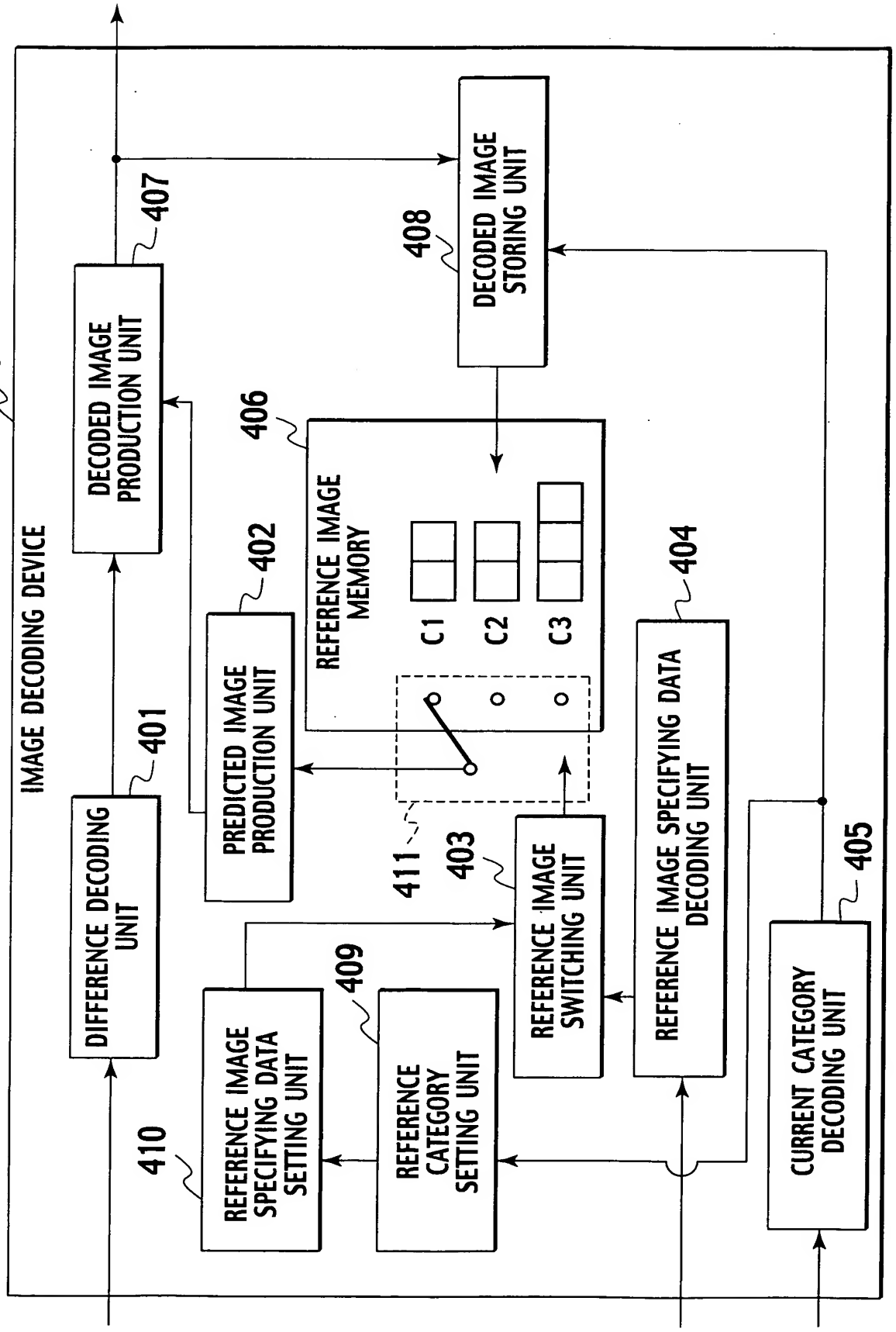

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FIG. 10

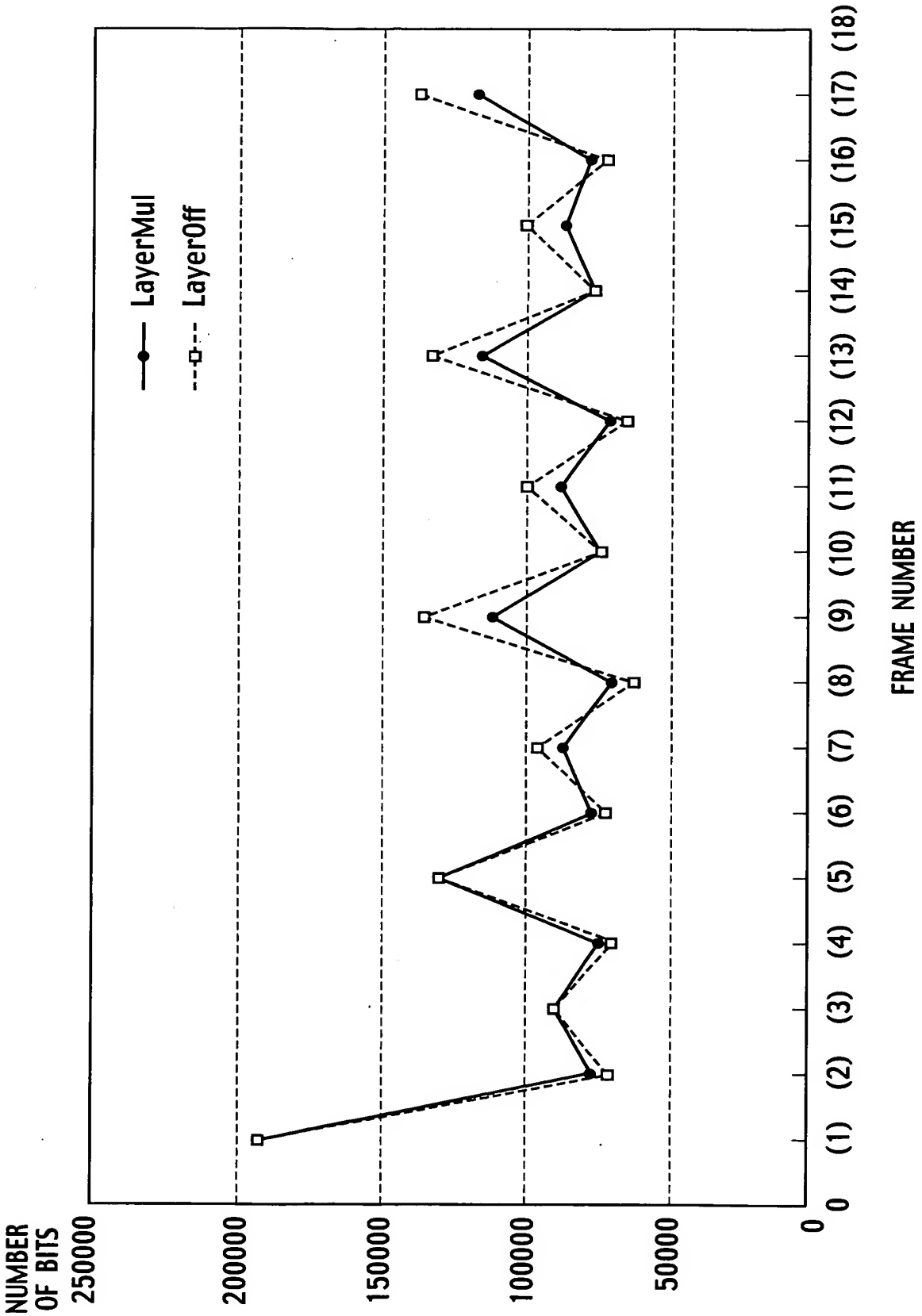

FIG. 11

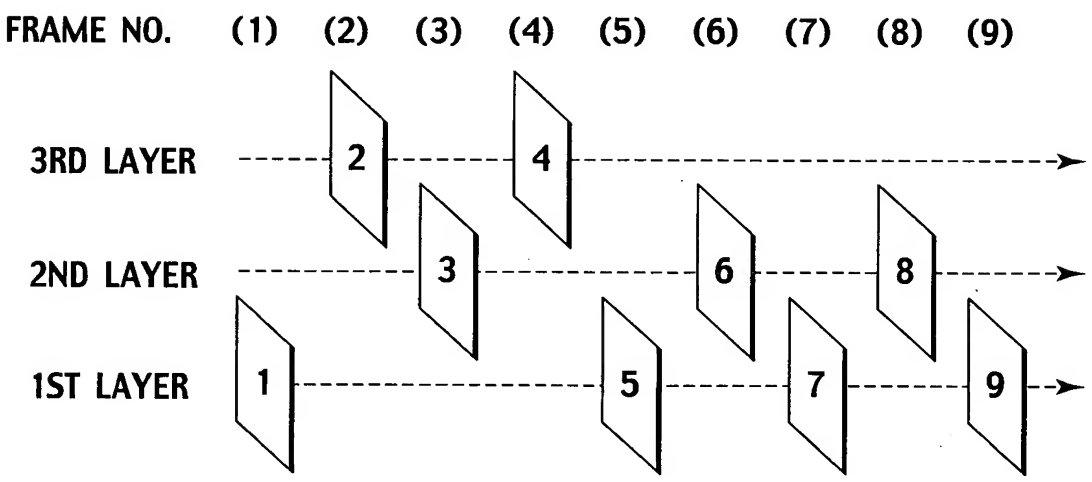

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FIG. 12

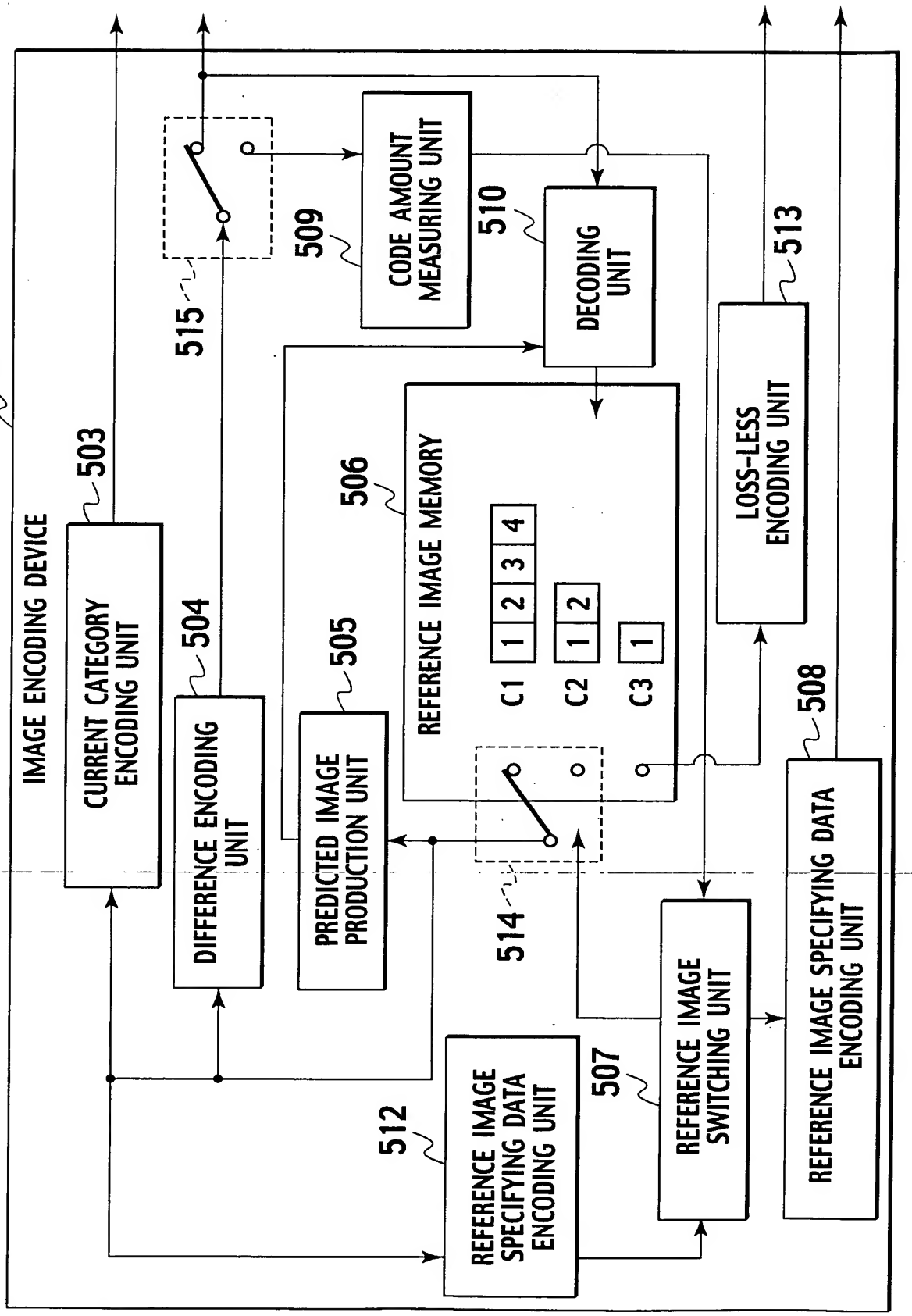

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FIG. 13

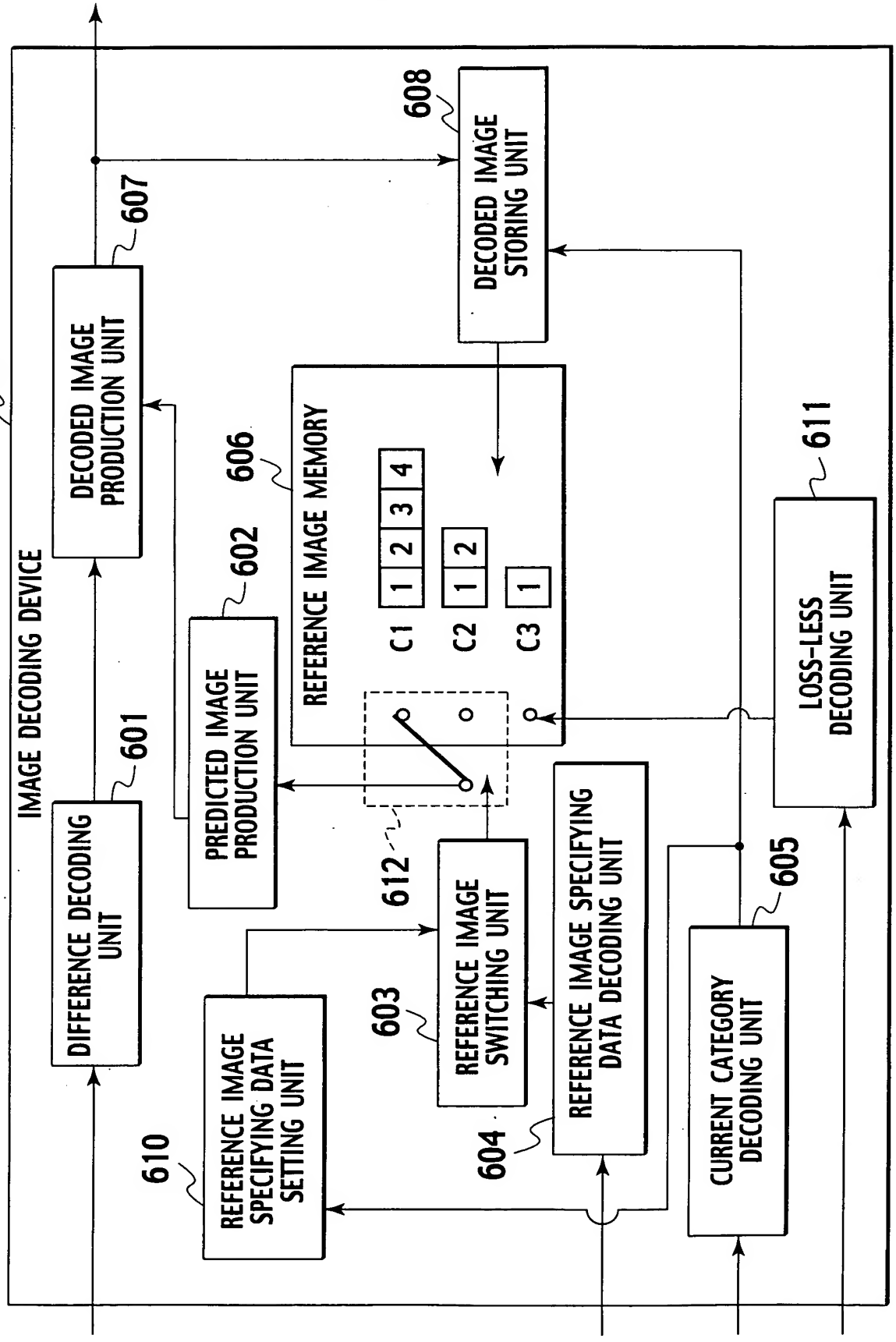

FIG. 14

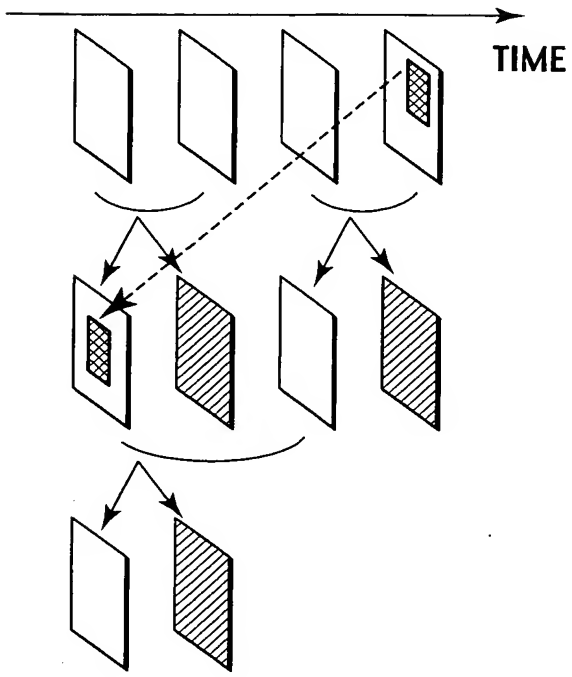

FIG. 15

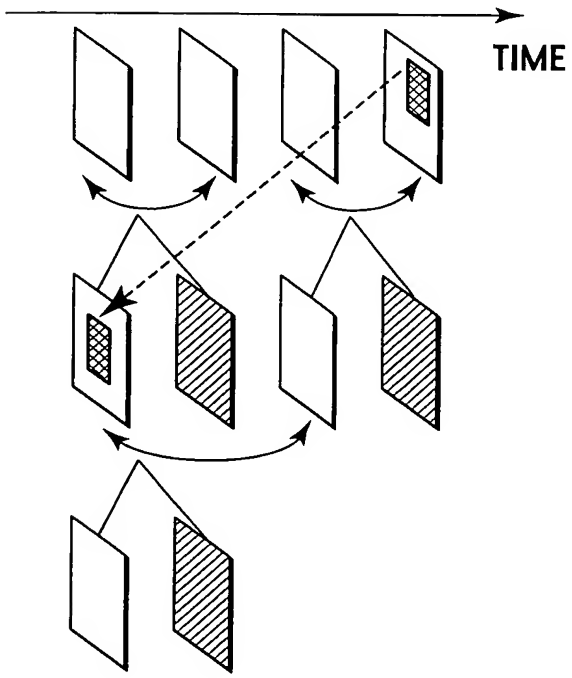

FIG. 16

(A) PREDICTION RELATIONSHIP OF IBBPBBP

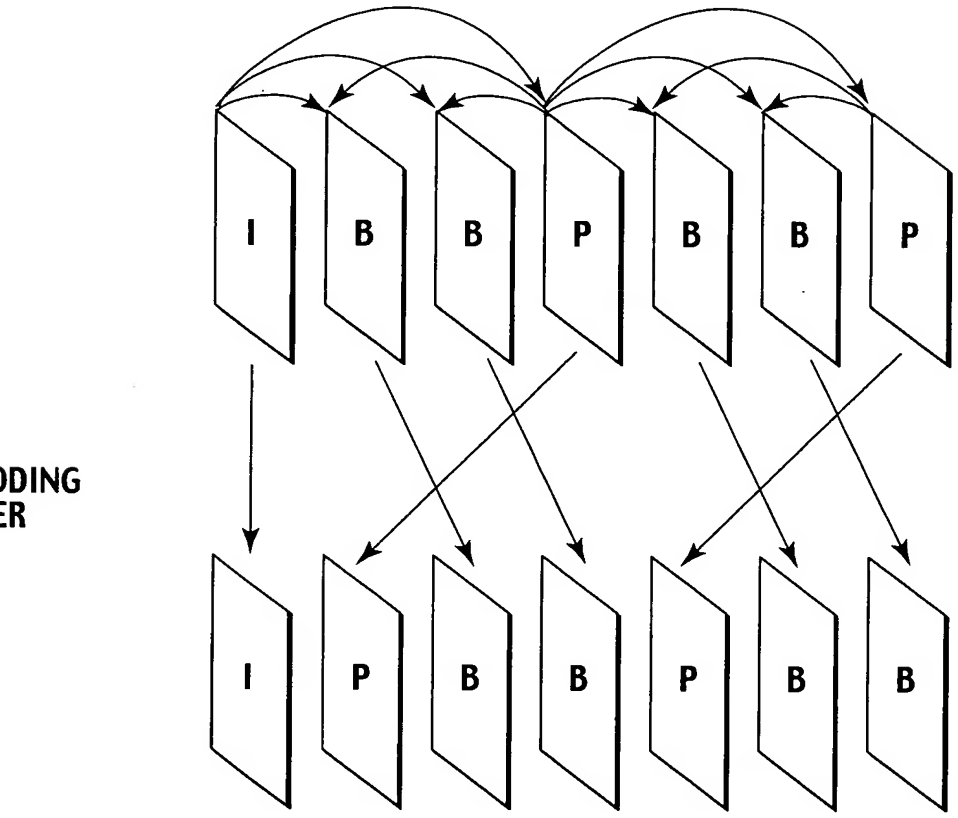

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FIG. 17

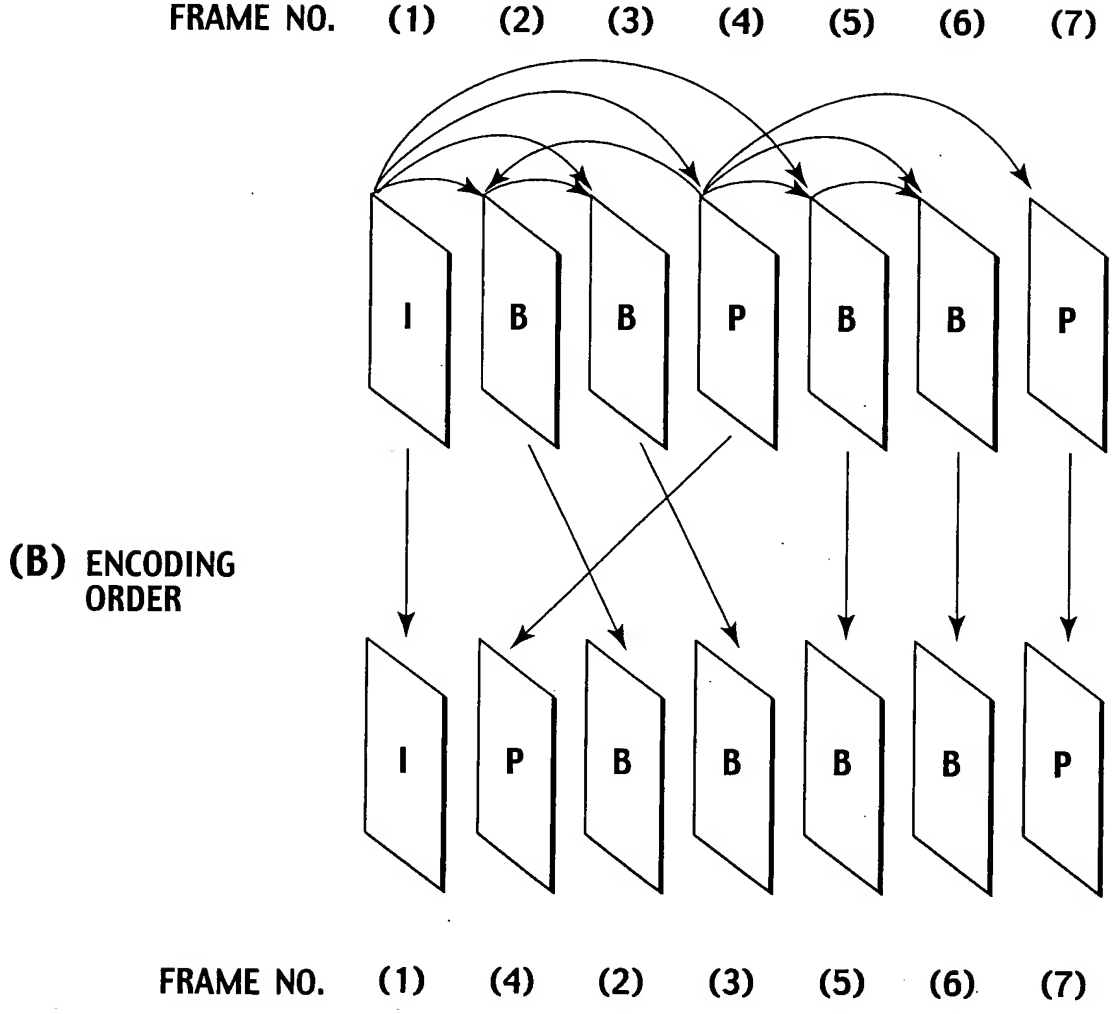

FIG. 18

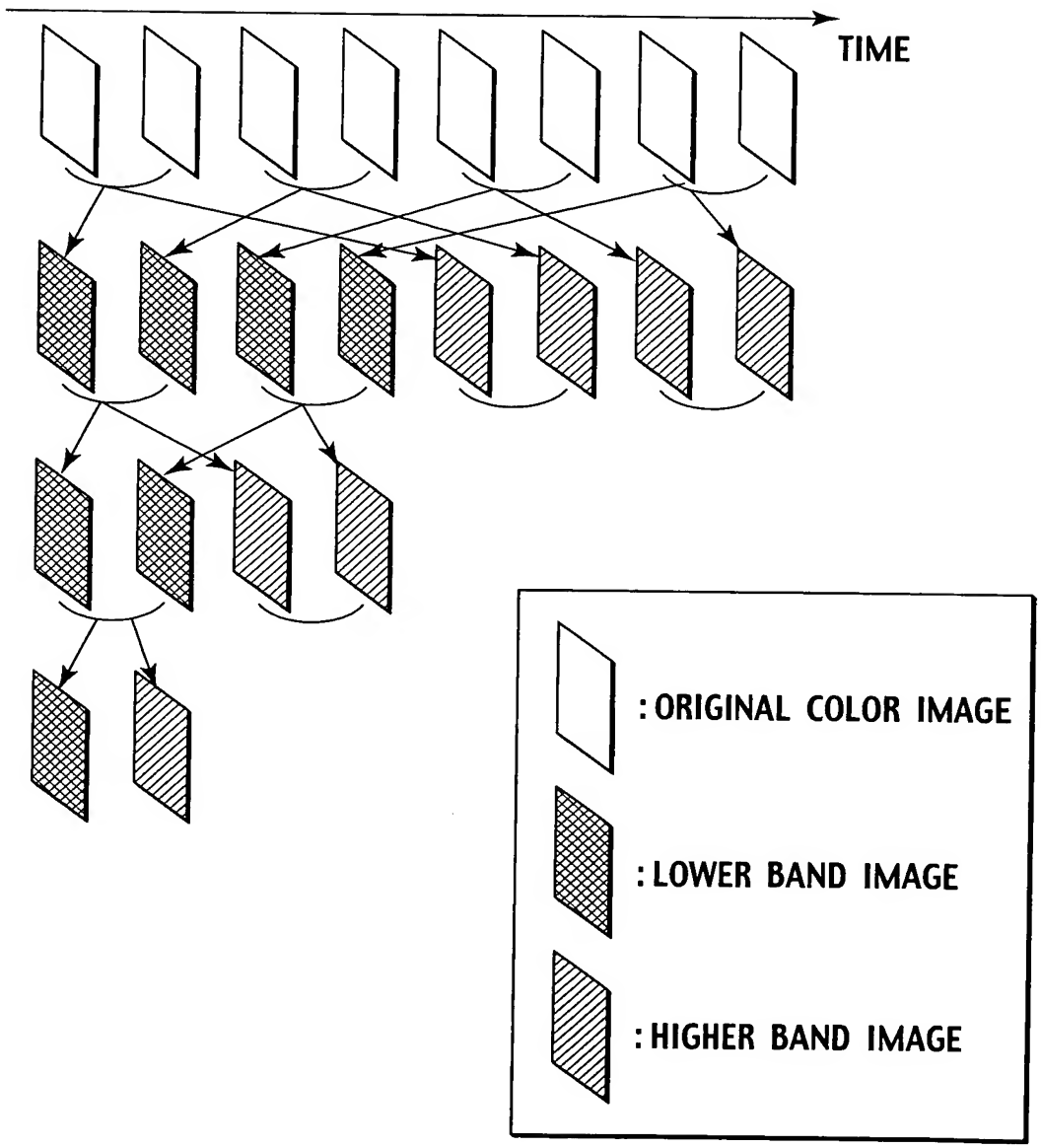
TIME
: ORIGINAL COLOR IMAGE
: LOWER BAND IMAGE
: HIGHER BAND IMAGE

FIG. 19

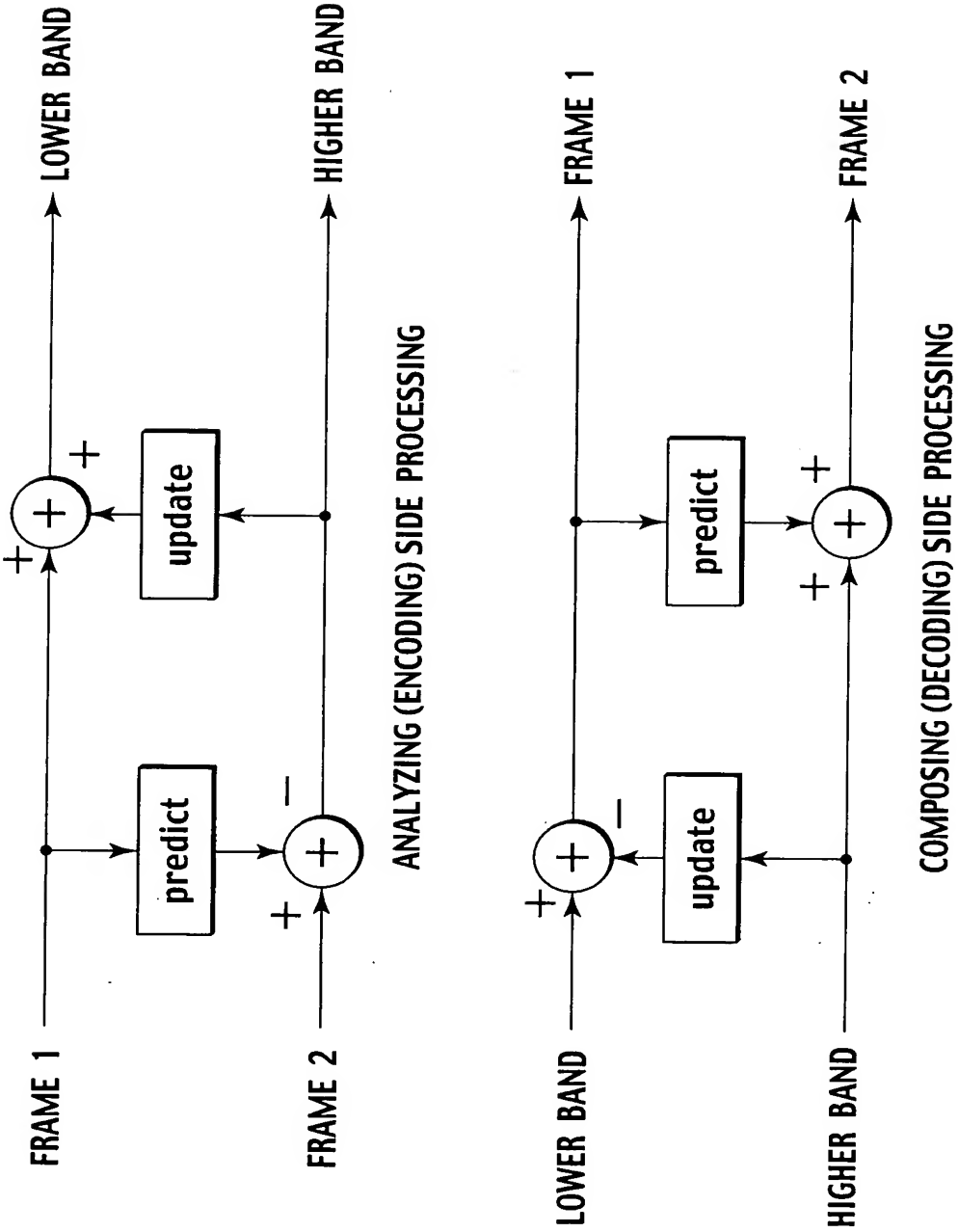
LOWER BAND
HIGHER BAND
update
predict
FRAME 1
FRAME 2
ANALYZING (ENCODING) SIDE PROCESSING
FRAME 1
FRAME 2
predict
update
LOWER BAND
HIGHER BAND
COMPOSING (DECODING) SIDE PROCESSING

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FIG. 20

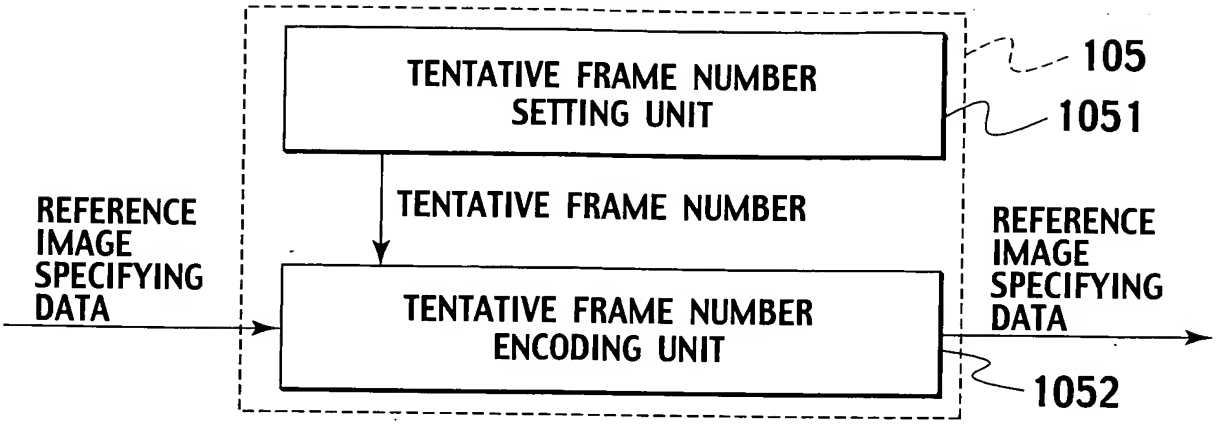

FIG. 21

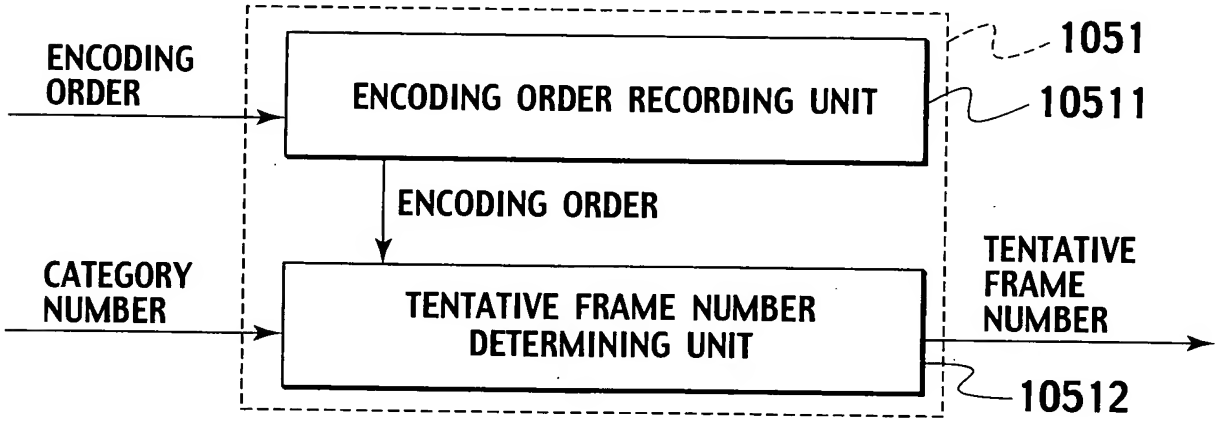

FIG. 22

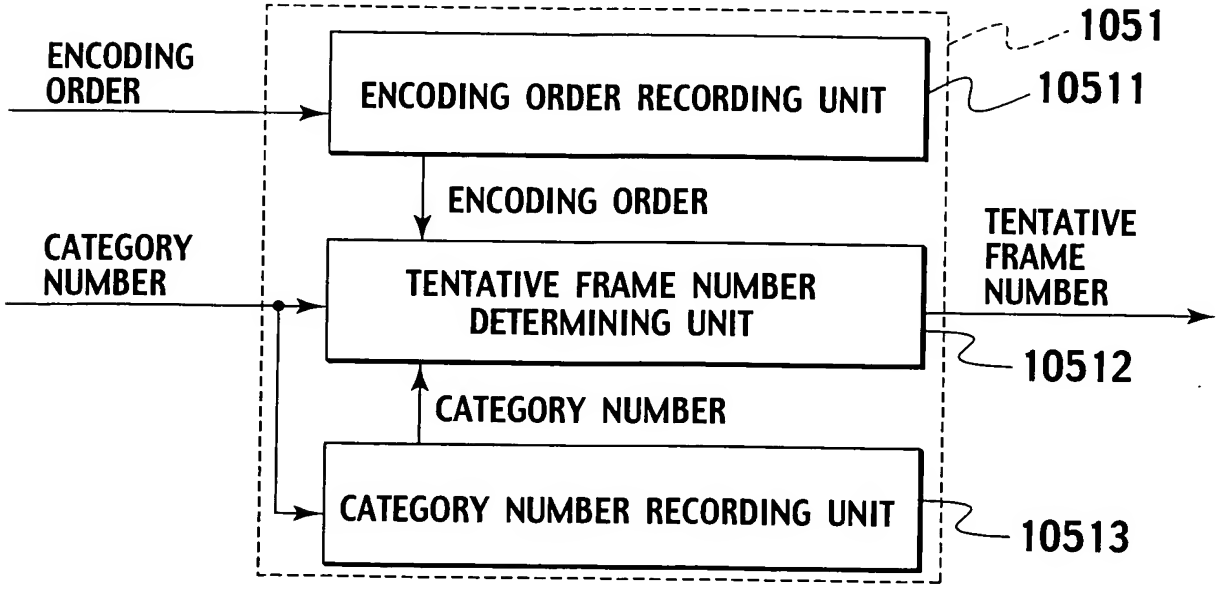

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FIG. 23

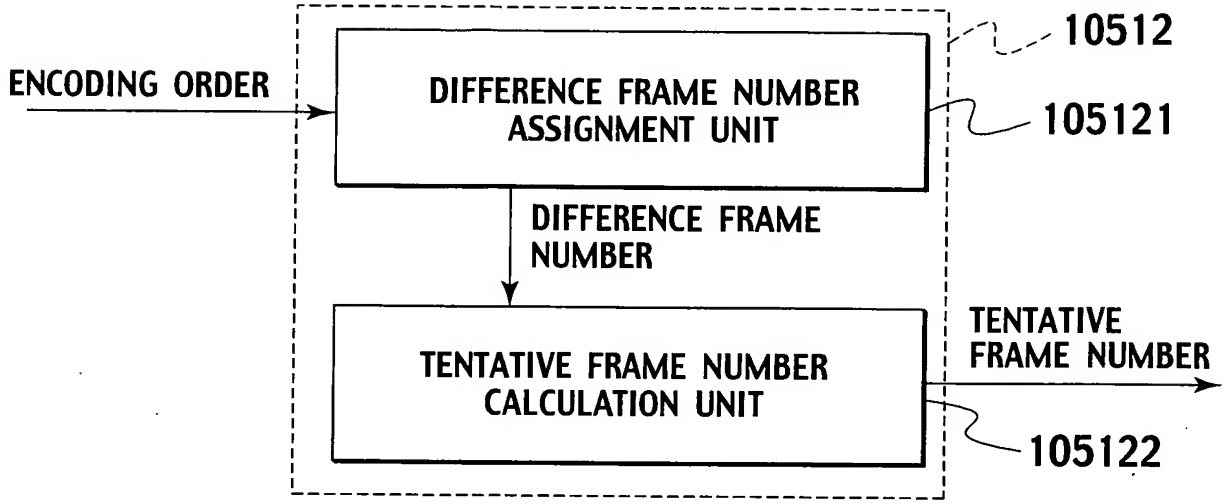
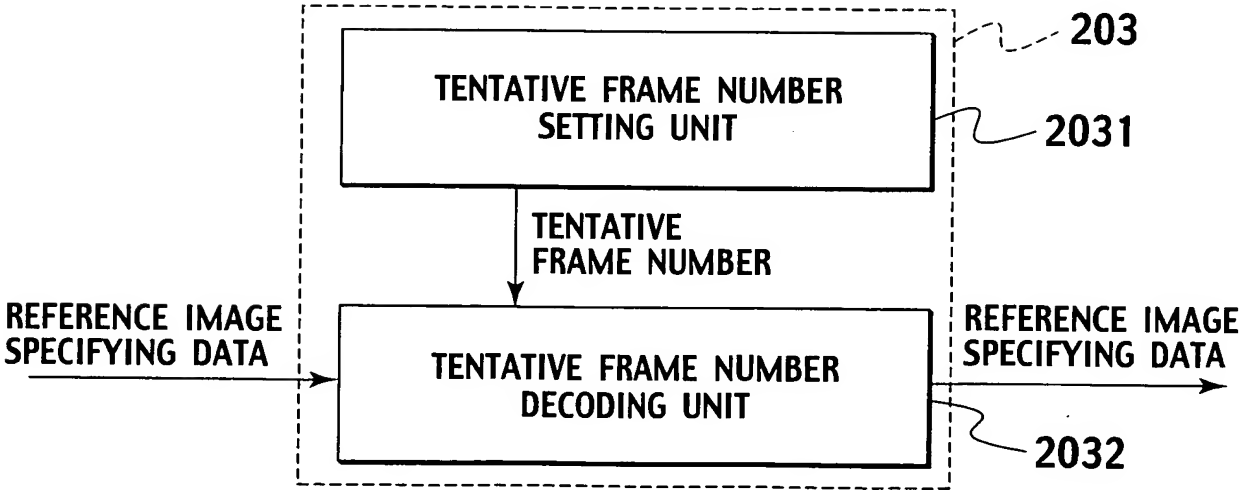
FIG. 24